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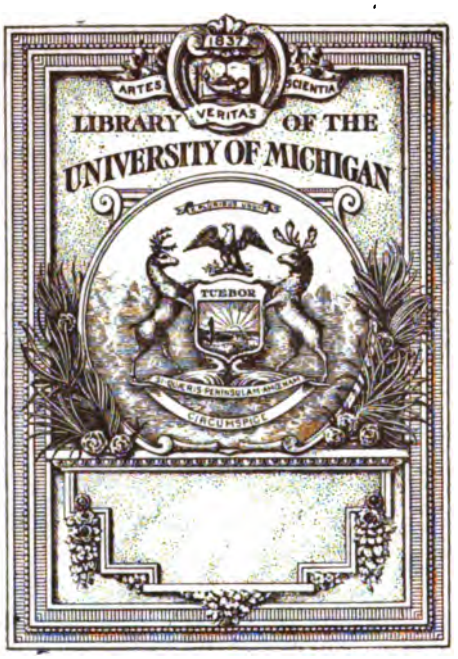
Uttmark's Textbook

on

Marc. St. Hilaire Method

For

Finding a Ship's Position at Sea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Marc St. Hilaire Method

for

Finding a Ship's Position at Sea

by

Capt. F. E. Uttmark

President of Uttmark's Nautical Academy
8 State Street, New York
Professor in Navigation and Nautical Astronomy
Author of a New System of
Navigation and Nautical Astronomy
Text Book on Marc St. Hilaire Method
Inventor of Uttmark's Plotting Chart, Etc.
Editor Uttmark's Nautical News

Published by the Author
Price, $2.50

To those who are serving their country in the U. S. Navy and the U. S. Merchant Marine this work is dedicated.

Copyrighted, 1919, by Capt. F. E. Uttmark

Marc St. Hilaire Method for Finding a Ship's Position at Sea.

The above method, introduced by Admiral Marc St. Hilaire of the French Navy about thirty years ago, is generally conceded to be the most popular and convenient for finding a ship's position, and with the aid of the newly invented Uttmark's Plotting Chart, it is reduced to the greatest simplicity. The same small plotting chart with the universal Latitude scale on Mercator's principle, is used for all latitudes between 60° North and 60° South and for all longitudes.

Using the Cosine-Haversine formula, the Government Azimuth Tables Hydrographic Office (H. O.) Nos. 71 and 120 and Bowditch Tables, we have a uniform and simple method for the solution of all the problems. The derivation of the formula is found in Bowditch Navigator and there amply demonstrated.

It is the author's aim in this work to present to the student simple working rules that may be easily grasped by the average busy navigator; a number of examples have been worked out covering all practical combinations, and given in full with positions shown plotted on the new plotting chart.

The author is indebted to Gilbert P. Chase, Lieutenant-Commander, U. S. N., for the courtesy in supplying some of the problems used in this work which are very valuable on account of being derived from actual observations taken on board ship under various conditions.

Hoping this work will be of service to the navigator,

I am very sincerely yours,

THE AUTHOR.

The Following Article Is a Reprint From United States Naval Institute Proceedings, Published at Annapolis, Md., June, 1918:

THE NEW UTTMARK CHART.—The Marc St. Hilaire method of finding a ship's position at sea is one of the best in existence by employing the intersection of the Sumner lines, and is used extensively in the U. S. Navy and gaining in popularity in the merchant marine. When the stars and planets or moon are visible and the horizon clear it is possible to select two conveniently situated heavenly bodies from which to make observations and to plot position on the chart at any desired moment. There are also times during the day when the sun and moon are both visible, and occasionally the planet Venus is in such a position that it can be observed when it crosses the meridian. This enables us to obtain latitude by the meridian observation and the ship's position by intersection of the Sumner lines. When the sun alone is visible it is necessary to make two observations with an interval of time. The point of intersection of two Sumner lines may be found by computation or by plotting on the chart, the latter being by far the more simple. Specially designed charts for plotting have the inconvenience, however, of being bulky; for example, to cover the latitude from the equator to sixty degrees, a set of 12 charts containing over 200 square feet of paper have been in use for many years. This difficulty is now obviated by Uttmark's plotting chart, invented by Captain F. E. Uttmark, of Uttmark's Nautical Academy, 8 State Street, New York City. This chart covers all latitudes from 60 degrees north to 60 degrees south, and all longitudes.

It is less than 1 square foot in area, has a scale of 6 inches to 1 degree of longitude, as compared with a scale of 4 inches to 1 degree of longitude of the former charts, and is therefore 50 per cent more efficient than the scale on the plotting chart published by the U. S. Hydrographic Office. Captain Uttmark's chart may be used for plotting ship's position by any method using the Sumner lines.

Explanation

In the Marc St. Hilaire Method we calculate what the altitude of a heavenly body, the sun, moon, planet or fixed star should be at a given instant, if seen from the assumed ship's position by Dead Reckoning.

An altitude of the heavenly body is measured with the sextant, corrected for dip, refraction, etc., in the usual way, and the true altitude found. Unless the Dead Reckoning is correct, there will be a difference between the calculated and the true altitudes. This is called **Altitude Difference** or **Intercept,** and provides us with co-ordinates or, in other words, lines which are the means for finding the ship's correct position.

General Rules

Marc St. Hilaire Method may be used at any time, but owing to the more rapid change in azimuth of the heavenly bodies when on or near the meridian, the best results are obtained when the object is, say 20° or more from the meridian. If the object is on the meridian use D. R. Latitude and Declination, and if near the meridian, use also the ex-meridian augmentation in computing the zenith distance and hence the calculated altitude.

Rules for Solar Observations

We require:

1. The sun's westerly hour angle (t), which is the ship's astronomical apparent time.
2. The latitude of ship.
3. The sun's declination.
4. Latitude difference declination (Lat. $\pm$ Decl.).
5. Equation of time.
6. True altitude.
7. True azimuth.

To Find the Westerly Hour Angle (t)

Rule I. To the chronometer time of observation apply the error or rate; this will give Greenwich mean time (G. M. T.). Express this in astronomical time and apply equation of time according to its sign in the Nautical Almanac. The result is Astr. Gr. Ap. time (Astr. G. A. T.). Convert ship's longitude by D. R. into time and apply to Astr. G. A. T. Add if in East, subtract if in West longitude. The result is the ship's Astr. apparent time or the sun's westerly hour angle (t).

Rule II. **The Latitude of ship.**

This is found by Dead Reckoning.

Rule III. **Sun's Declination.**

This is taken out for G. M. T. of observation from the Nautical Almanac.

Rule IV. **Lat. Difference Declination.**

If latitude and declination have **same** names, **subtract** the lesser from the greater.
If **different** names, **add** together; the result is Lat. diff. Decl. or Lat. $\pm$ Decl.

Rule V. **Equation of time.**

This is taken out for G. M. T. of observation from the Nautical Almanac.

Rule VI. **True altitude.**

For sun's lower limb use Table 46 Bowditch, for upper limb apply dip, refraction, parallax and semi-diameter in the usual way. Do not forget Index Error if any.

Rule VII. **True azimuth.**

This is found in the Azimuth Tables H. O. 71 and 120, using ship's apparent time, Lat. of ship and Decl. of the heavenly body.

Rules for Computing the Altitude Difference or Intercept

Observe the altitude with the sextant and note the chronometer time at that instant.

Find H. A. (t), Rule 1. Find True altitude (h t), Rule VI.

For the westerly H. A. (t)	take out log hav. Tab. 45	add
For the Latitude	take out log cos. Tab. 44	
For the Declination	take out log cos. Tab. 44	

Add these three logs together and you have the log hav. for a certain quantity which is not in itself required, but take out the corresponding natural haversine (nat. hav.), which will be found in the column immediately to the right of log. hav. To this nat. hav. add the nat. hav. for Lat. diff. Decl. (see Rule IV). The result is nat. hav. for Zenith Distance (Z. D.) which will be found in Table 45. Subtract Z. D. from 90° and we have the computed altitude (h c). Under this write down the true altitude (h t) and subtract the lesser from the greater; the result is the alt. diff. or Intercept. Name this + or go towards if the true altitude is the greater; but — or go away if the true altitude is the lesser.

Take out the azimuth of the heavenly body (see Rule VII) and write it down.

PLOTTING THE SUMNER LINES OR LINES OF POSITION

Rules for Sun Observations

Mark the ship's position by D. R. on the chart. From this point draw a line in the direction of the azimuth **towards** the sun if the intercept is plus, but in the direction **away from** the sun if the intercept is minus. On this line measure off the intercept, and draw a line at right angles to it; this is the first line of position or Sumner line.

A single observation will not give an astronomical fix. When the sun is the only body used for observation we have to wait until the azimuth is changed 20° or more. Then take the second sight.

Note the ship's true course and distance run during the interval and bring the D. R. position up to time of second sight. Mark the D. R. position at second sight on the chart; from this position draw the second azimuth, mark off the intercept and through this point draw the second Sumner line. The ship's position or astronomical fix is at the intersection of the Sumner lines.

Rules for plotting the Sumner lines when two or more heavenly bodies have been observed

Mark the ship's position by D. R. on the chart. From this point draw the azimuth lines; mark off the intercepts and draw the Sumner lines. The ship is at the intersection of the Sumner lines.

The foregoing will give a clear explanation of the problem and the rule used when plotting the ship's position on the regular chart. **The following gives the solution in its simplest form** and demonstrates the usefulness of Uttmark's Plotting Chart.

Rules for plotting position lines on Uttmark's plotting chart when two solar sights have been taken with run between observations.

Let the center of the compass diagram represent the ship's position by D. R. at the ***first sight,*** *from this center plot azimuth line, mark off the intercept and draw the first Sumner line. (Position line.)*

To D. R. position at first sight apply the course and distance run during the interval and obtain D. R. position at the second sight.

Let the ***center*** *of the* ***same compass rose*** *also represent the ship's position by D. R. at the* ***second sight.*** *From this center draw azimuth line; mark off the intercept and draw the second Sumner line, the ship is at the intersection of the Sumner lines.*

To find the true Latitude of the ship at the second observation, **measure** on the **scale corresponding to the D. R. position** the number of miles the ship is North or South of said position, and apply to D. R. lat. second sight. The result is ship's true latitude. The true longitude is found by **measuring** on the **longitude scale** the number of minutes of longitude the ship is East or West of the assumed D. R. longitude position at second sight, and apply same to D. R. longitude.

Rules for Stellar Observations

For convenience sake we include in this expression the moon, planets and fixed stars, as the general working rules are the same for all.

To find the star's westerly hour angle. To the astronomical chronometer time of observation apply its error in order to get astronomical mean time at Greenwich (Astr. G. M. T.); to this apply the longitude converted into time, **adding** if in East, but **subtracting** if in west longitude; the result is astronomical mean time at ship (Astr. G. M. T.). To this **add** the mean sun's right ascension (R. A. M. S.) plus its correction taken from the Nautical Almanac; the result is the Local Sidereal Time (L. S. T.). From this L. S. T. **subtract** the star's right ascension, adding 24 hours to L. S. T. if necessary. The remainder is the star's westerly hour angle (t). If the hour angle exceeds 24 hours, reject 24 hours. The rest of the problem is worked exactly the same as for the sun.

Note: ***The westerly hour angle (t).***

It is most convenient to use the westerly hour angle in working all the problems. The westerly hour angle is reckoned from the meridian westward up to 24 hours, and holds good for all the heavenly bodies including the sun.

When the hour angle is less than 12 hours, read the hours and minutes from top of the page and the seconds from the left-hand column. If the hour angle is greater than 12 hours, read the hours and minutes from the bottom of page and the seconds from the right-hand column. Table 45, Bowditch.

Rules for plotting Sumner lines on Uttmark's Plotting Chart when simultaneous observations have been taken of two or more heavenly bodies.

Consider the center of the compass rose the D. R. position of the ship. From this point draw the azimuth lines, mark off the intercept and draw the Sumner lines. The ship is at the intersection of the Sumner lines. The true latitude and longitude is found according to the same rules as given for solar observations.

Problem No. 1

MARC ST. HILAIRE METHOD

May 14, 1918, P. M. at ship. In latitude by D. R. 38° 44′ N., longitude 72° 46′ W. Observed altitude of sun's lower limb 42° 00′ 00″. Chronometer time at observation 8h 6m 53s; then ship ran on a true course N. 54° E. (54°), 22 miles, and again observed altitude of sun's lower limb 16° 23′. Chronometer at second observation 10 hours, 18 min. 5 sec. Chronometer slow on G. M. T. 2m. 10s. Height of eye 41 feet for both observations. **Ship's position** by D. R. at **second observation,** latitude 38° 57′ N., longitude 72° 23′ 00″ W.

Required the ship's true position at second observation.

1st Position by Sun				**Compass Bearing N 90° W**			
Chronometer	8h	06m	53s	Obs. Alt.....	42°	00′	00″
Rate .....+		2	10	Correction.....+		8′	37″
G. M. T.....	8	09	03	True Alt.....	42°	08′	37″
Eq. T.....+		3	49				
G. A. T.....	8	12	52				
Longitude W—	4	51	04				
H. A. (t)....	3h	21m	48s	Log. Hav.....9.25917			
Latitude	38°	44′	00″ N	Log. Cos.....9.89213			
Declination..	18°	34′	36″ N	Log. Cos.....9.97676			
				Log. Hav.....9.12806			
				Nat. Hav..... .13430			
Lat. — Decl.	20°	09′	24″	Nat. Hav..... .03063			
Zenith Dist.	47°	55′	15″	Nat. Hav..... .16493			
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	42°	04′	45″				
True Alt.(h t)	42°	08′	37″				
Intercept ...+		3′	52″	Go to 3′.9 True Azimuth (Z) N 100° W. or 260°.			

2nd Position by Sun				**Compass Bearing N 89° W**			
Chronometer	10h	18m	05s	Obs. Alt.....	16°	23′	00″
Rate .....+		2	10	Correction .....+		6′	27″
G. M. T.....	10	20	15	True Alt.....	16°	29′	27″
Eq. T.....+		3	49				
G. A. T.....	10	24	04				
Longitude W—	4	49	32				
H. A. (t).....	5h	34m	32s	Log. Hav.....9.64793			
Latitude.....	38°	57′	00″ N	Log. Cos.....9.89081			
Declination..	18°	36′	06″ N	Log. Cos.....9.97670			
				Log. Hav.....9.51544			
				Nat. Hav.....0.32766			
Lat. — Decl.	20°	20′	54″	Nat. Hav..... .03121			
Zenith Dist.	73°	36′	15″	Nat. Hav..... .35887			
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	16°	23′	45″				
True Alt.(h t)	16°	29′	27″				
Intercept ...+		5′	42″	Go to 5′.7 True Azimuth (Z) N 79° W. or 281°.			

Latitude ..... 39° 02′ 30″ N
Longitude ..... 72° 29′ 00″ W } **Astronomical fix 2nd sight.**

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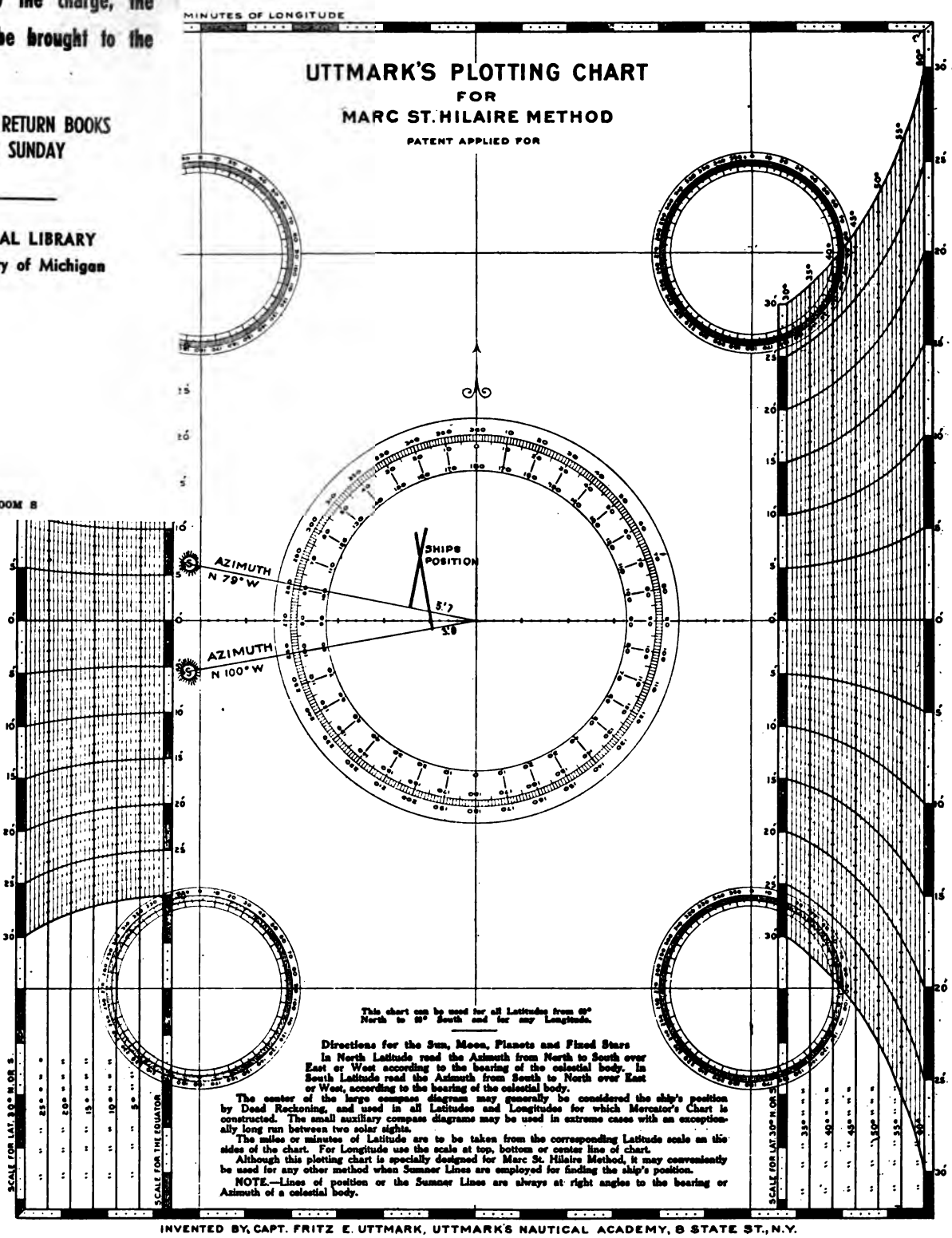

MINUTES OF LONGITUDE
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
AZIMUTH
N 79° W
AZIMUTH
N 100° W
SHIPS POSITION
5'7
5'8
This chart can be used for all Latitudes from 69° North to 69° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 30° N. OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N. OR S.
INVENTED BY, CAPT. FRITZ E. UTTMARK, UTTMARK'S NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 2

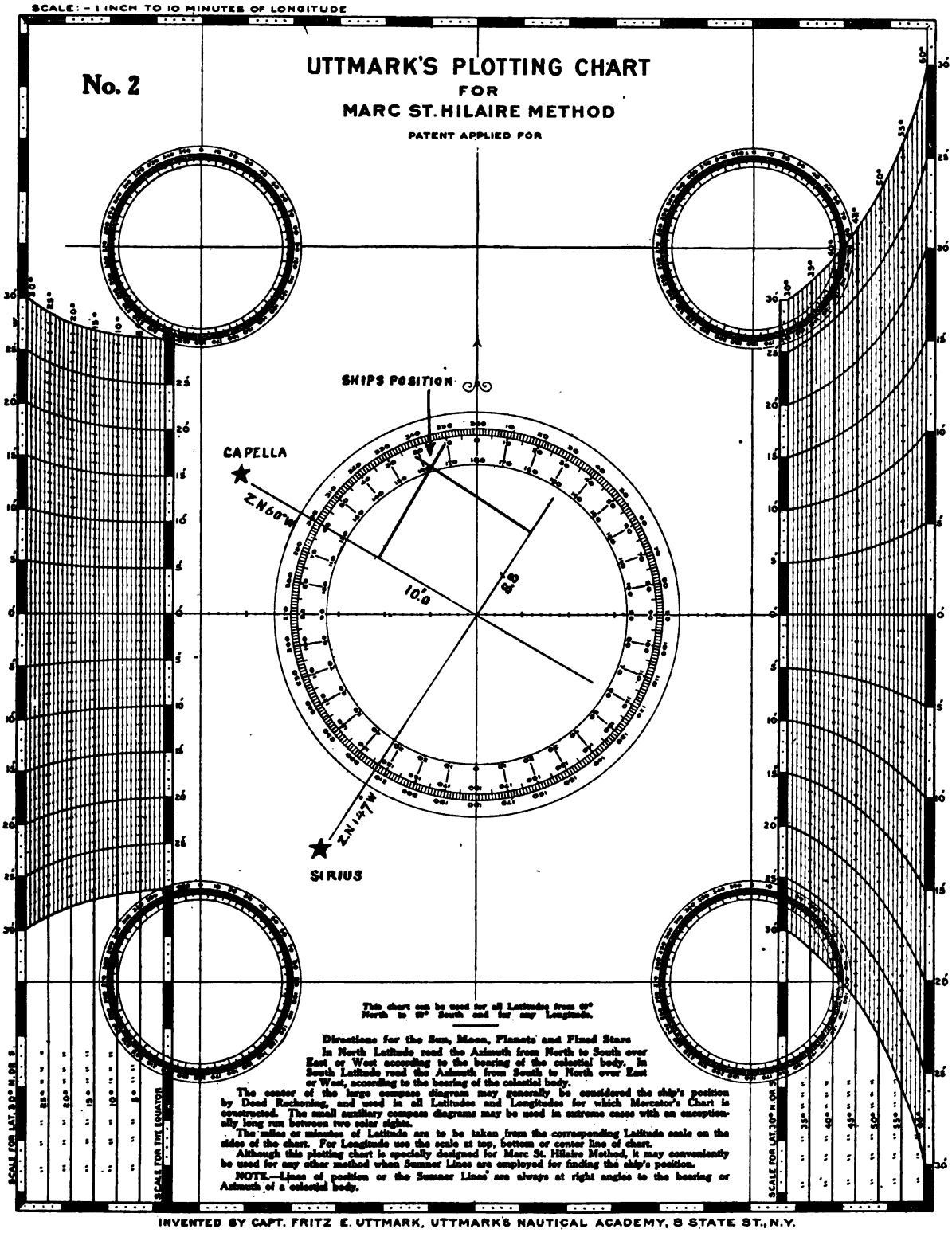
In the evening of April 16, 1918, ship's position by D. R., latitude 37° 14′ N., longitude 76° 04′ W. Observed altitude of the fixed star a Canis Majoris (Sirius) in the western sky 29° 29′. Chronometer 12h 03m 05s and immediately after observed altitude a Aurigæ (Capella) 50° 47′, also west of the meridian. Chronometer 12h 05m 05s. Chronometer slow of G. M. T. 2m 41s at both observations. Height of eye, 41 feet.

Required the ship's position.

Position Sirius West.				**Compass Bearing**			
Chronometer	12h	03m	05s	Obs. Alt.	29°	29′	00″
Rate	+	2	41	Correction ....—		8′	00″
G. M. T.....	12	05	46	True Alt.	29°	21′	00″
Longitude in Time W...—	5	04	16				
M. T. S.....	7	01	30				
R. A. M. S...	1	35	17				
Correction ..	+	1	59				
L. S. T.....	8	38	46				
★R. A.....—	6	41	33				
H. A. (t)....	1h	57m	13s	Log. Hav.....			8.80607
Latitude	37°	14′	00″ N	Log. Cos.....			9.90101
Declination..	16°	36′	24″ S	Log. Cos.....			9.98150
				Log. Hav.....			8.68858
				Nat. Hav.....			.04882
Lat. + Decl..	53°	50′	24″	Nat. Hav.....			.20499
Zenith Dist.	60°	30′	15″	Nat. Hav.....			.25381
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	29°	29′	45″				
True Alt.(h t)	29°	21′	00″				
Intercept ....—		8′	45″	Go away 8′.8 True Azimuth (Z) N 147° W or 213°.			

Position by Capsella West				**Compass Bearing N 52° W**			
Chronometer	12h	05m	05s	Obs. Alt.	50°	47′	00″
Rate	+	2	41	Correction .....—		7′	00″
G. M. T.....	12	07	46	True Alt.	50°	40′	00″
Longitude in Time ...W—	5	04	16				
M. T. S.....	7	03	30				
R. A. M. S...	1	35	17				
Correction...		1	59				
L. S. T.....	8	40	46				
★R. A.....—	5	10	39				
H. A. (t)....	3h	30m	07s	Log. Hav.....			9.29186
Latitude	37°	14′	00″ N	Log. Cos.....			9.90101
Declination..	45°	55′	06″ N	Log. Cos.....			9.84241
				Log. Hav.....			9.03528
				Nat. Hav.....			.10847
Lat. — Decl..	8°	41′	06″	Nat. Hav.....			.00573
Zenith Dist.	39°	30′	00″	Nat. Hav.....			0.11420
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	50°	30′	00″				
True Alt.(h t)	50°	40′	00″				
Intercept ....+		10′	00″	Go to 10′ True Azimuth (Z) N 60° W or 300°.			

Latitude .....37° 27′ N
Longitude .....76° 09′ W
} True position of ship


SCALE:- 1 INCH TO 10 MINUTES OF LONGITUDE
No. 2
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
SHIPS POSITION
CAPELLA
Z N 60° W
10.0
8.8
Z N 14° W
SIRIUS
This chart can be used for all Latitudes from 0° North to 0° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagrams may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 30° N. OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N. OR S.
INVENTED BY CAPT. FRITZ E. UTTMARK, UTTMARK'S NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 3

About 7:30 P. M. on May 18, 1918, ship's position by D. R. 40° 40′ N., and longitude 69° 00′ W. Observed altitude of the Pole star (a Ursæ Minoris) 39° 44′. Chronometer 12h 30m 5s, and immediately after observed altitude of a Lyræ (Vega) 16° 32′ East of the meridian. Chronometer 12h 32m 26s. Chronometer slow on G. M. T. 4m 00s. Height of eye, 41 feet.

Required the position of the ship.

Note.—Work out the hour angle of the Pole star and compute the altitude from data given in the Nautical Almanac.

Position			
Obs. Alt. Pole Star	39°	44′	00″
Corr. Table 46...	—	7	26
True Alt.....	39°	36′	34″
Lat. D. R....	40°	40′	00″ N
Polar corr...—	1°	00′	38″
Com.Alt.(h c)	39°	39′	22″
True Alt. (h t)	39	36	34 N
Intercept ...—		2′	48″

Go away 2′.8 True Az. North.

Compass Bearing North			
Chronom. 18d	12h	30m	05s
Slow		4	00
Ast. G.M.T....	12	34	05
Longitude in Time ...W—	4	36	00
Ast.M.T. Ship	7	58	05
R. A. M. S...+	3	41	26
Cor. Tab. III+		2	04
Local Sidereal Time..	11	41	35
★ R. A. ....—	1	30	13
H.A. Polaris.	10h	11m	22s

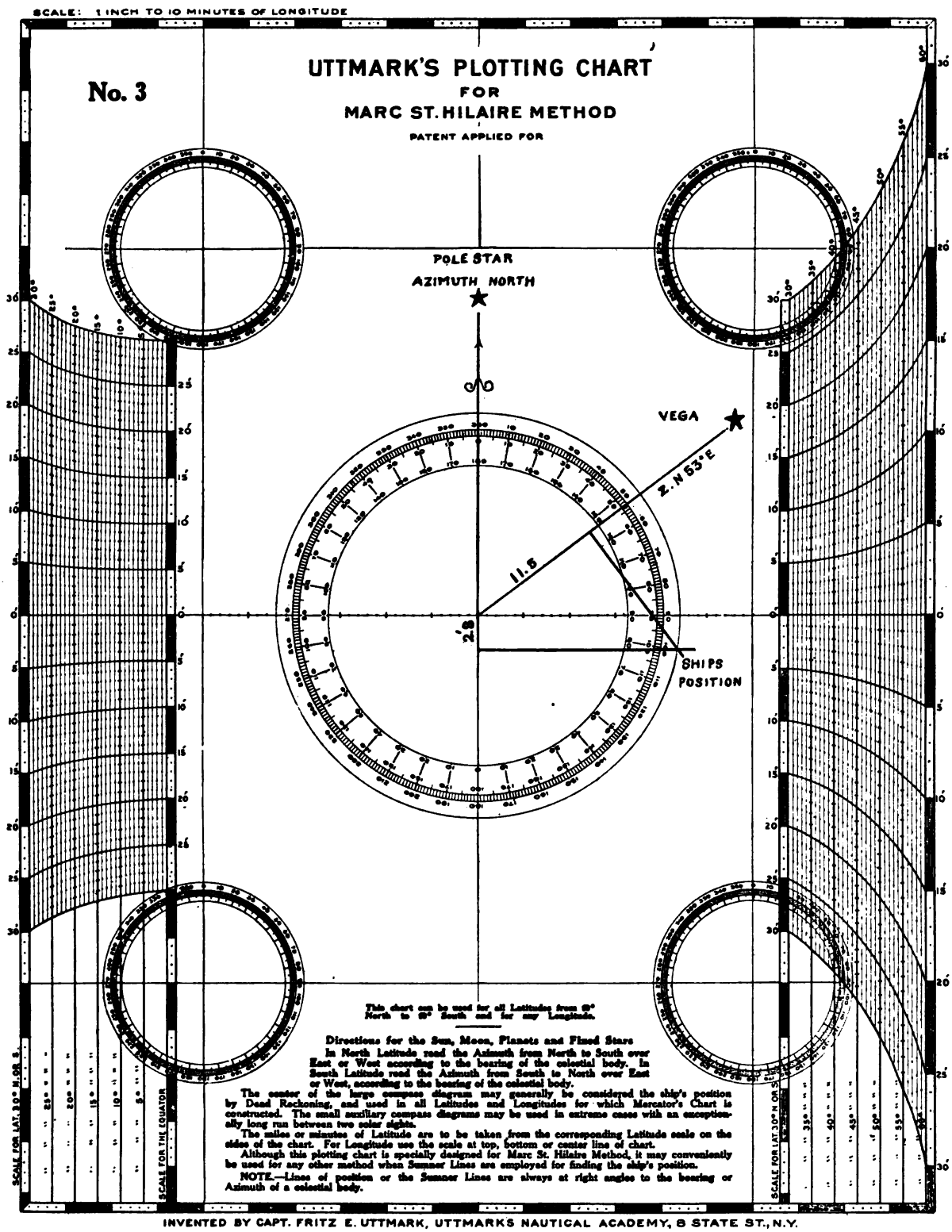
Decl. Polaris. 88° 52′ 2″ N

Position Vega East			
Chronometer	12h	32m	26s
Rate .....+		4	00
G. M. T.....	12	36	26
Longitude in Time ....E—	4	36	00
M. T. S.	8	00	26
R. A. M. S...	3	41	26
Correction...		2	04
L.S.T. (+24h)	11	43	56
★ R. A. ....—	18	34	12
H. A. (t).....	17h	09m	44s
Latitude	40°	40′	00″ N
Declination..	38°	42′	12″ N
Lat. — Decl.	1°	57′	48″
Zenith Dist...	73°	49′	00″
Sub. from 90°	89°	59′	60″
Com.Alt.(h c)	16°	11′	00″
True Alt. (h t)	16°	22′	30″
Intercept ....+		11′	30″

Compass Bearing			
Obs. Alt.	16°	32′	00″
Correction	—	9′	30″
True Alt.	16°	22′	30″
Log. Hav.....			9.78447
Log. Cos.....			9.87996
Log. Cos.....			9.89231
Log. Hav.....			9.55674
Nat. Hav.....			.36036
Nat. Hav.....			.00029
Nat. Hav.....			.36065

Go to 11′.5 True Azimuth (Z) N. 53° E. or 53°.

Latitude ..... 40° 37¼′ N
Longitude ..... 68° 38½′ W } Astronomical Fix.


SCALE: 1 INCH TO 10 MINUTES OF LONGITUDE
No. 3
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
POLE STAR
AZIMUTH NORTH
VEGA
Z. N 53° E
11.5
28
SHIPS POSITION
This chart can be used for all Latitudes from 0° North to 0° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Summer Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Summer Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 30° N. OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N OR S.
INVENTED BY CAPT. FRITZ E. UTTMARK, UTTMARKS NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 4

At sea before sunrise, May 20, 1916, about 4:30 A. M. ship's position by D. R., latitude 36° 55′ N. and longitude 75° 30′ W., took simultaneous observations of the planet Jupiter and the moon. Observed altitude of Jupiter 14° 47′ bearing East. Chronometer 9h 30 m 13s A. M. Immediately after observed altitude of moon's upper limb 22° 52′ west of the meridian. Chronometer 9h 32m 57s A. M. Chronometer fast of Greenwich mean time 2m 10s. Height of eye, 41 feet.

Declination of Jupiter at time of obs. = 7° 52′ 00″ N.
Right ascension of Jupiter at time of obs. = 1h 26m 28s.
Declination of the moon at time of obs. = 25° 10′ 42″ S.
Right ascension of the moon at time of obs. = 18h 35m 31s.
Mean Sun's Right Ascension (R. A. M. S.) at Gr. noon, 3h 47m 17s.
Correction for time of observation, + 3m 32s.
Correction for moon's upper limb, 30′ 30″ to be added.

Required the ship's position.

Position Jupiter E			
Chronometer	21h	30m	13s
Rate .....—		2	10
G. M. T.....	21	28	03
Longitude in Time ...W—	5	02	00
M. T. S.....	16	26	03
R. A. M. S...	3	47	17
Correction ..+		3	32
L. S. T.....	20	16	52
♃ R. A.....	1	26	28
H. A. (t).....	18h	50m	24s
Latitude	36°	55′	00″ N
Declination..	7°	52′	00″ N
Lat. — Decl..	29°	03′	00″
Zenith Dist.	75°	13′	45″
Sub. from 90°	89°	59′	60″
Com.Alt.(h c)	14°	46′	15″
True Alt.(h t)	14°	37′	12″
Intercept ....—		9′	3″

Compass Bearing			
Obs. Alt. Jupiter	14°	47′	00″
Correction ....—		9′	48″
True Alt.	14°	37′	12″
Log. Hav.....			9.59210
Log. Cos.....			9.90282
Log. Cos.....			9.99589
Log. Hav.....			9.49081
Nat. Hav.....			.30961
Nat. Hav.....			.06290
Nat. Hav.....			.37251

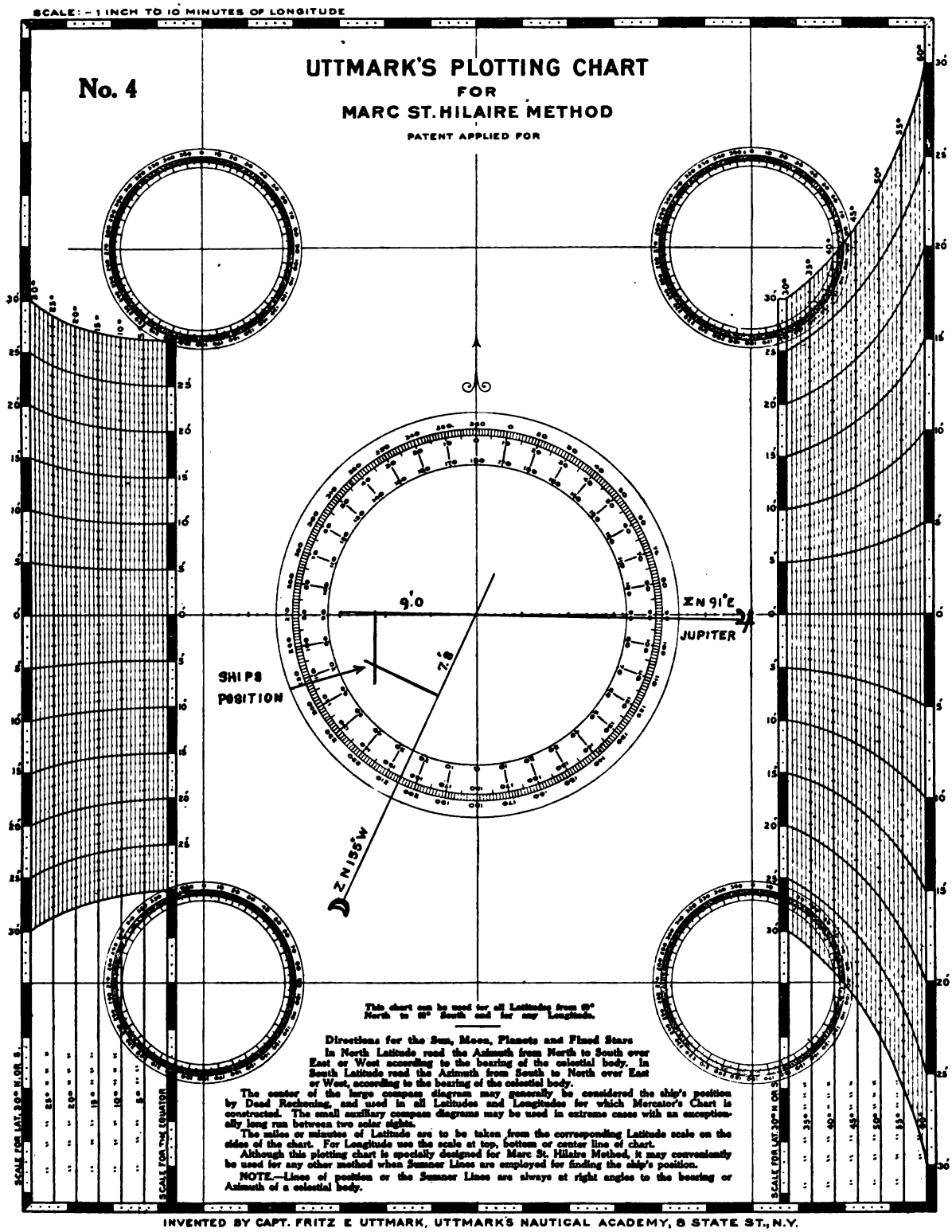
Go away 9′ True Azimuth (Z) N 91° E or 91°.

Position Moon West			
Chronometer	21h	32m	57s
Rate .....—		2	10
G. M. T.....	21	30	47
Longitude in Time ...W—	5	02	00
M. T. S.....	16	28	47
R. A. M. S...	3	47	17
Correction ..		3	32
L. S. T.....	20	19	36
☽ R. A.	18	35	31
H. A. (t)....	1h	44m	05s
Latitude	36°	55′	00″ N
Declination..	25°	10′	42″ S
Lat. + Decl..	62°	05′	42″
Zenith Dist...	66°	45′	15″
Sub. from 90°	89°	59′	60″
Com.Alt.(h c)	23°	14′	45″
True Alt.(h t)	23°	22′	30″
Intercept ....+		7′	45″

Compass Bearing			
Obs. Alt. ☽ U. L.	22°	52′	00″
Correction ....+		30′	30″
True Alt.	23°	22′	30″
Log. Hav.....			8.70486
Log. Cos.....			9.90282
Log. Cos.....			9.95663
Log. Hav.....			8.56431
Nat. Hav.....			.03667
Nat. Hav.....			.26600
Nat. Hav.....			.30267

Go to 7′.8 True Azimuth (Z) N 155° W or 205°.

Latitude .....36° 50′½ N } Astronomical fix of ship at time of
Longitude .....75° 41′ W } observation.


SCALE:—1 INCH TO 10 MINUTES OF LONGITUDE
No. 4
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
9.0
Z N 91° E
JUPITER
7.6
SHIPS POSITION
Z N 195° W
This chart can be used for all Latitudes from 0° North to 60° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.
INVENTED BY CAPT. FRITZ E UTTMARK, UTTMARK'S NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 5

Early morning, Tuesday, August 22, 1916, in latitude by D. R. 38° 42′ N., longitude 62° 15′ W. Chronometer 9h 33m 52s A. M. Observed altitude of the planet Venus 39° 18′ 30″ East of the meridian, and immediately after observed altitude of the planet Jupiter West of the meridian 58° 35′. Chronometer 9h 35m 43s A. M. Chronometer correct for G. M. T. Height of eye, 39 feet.

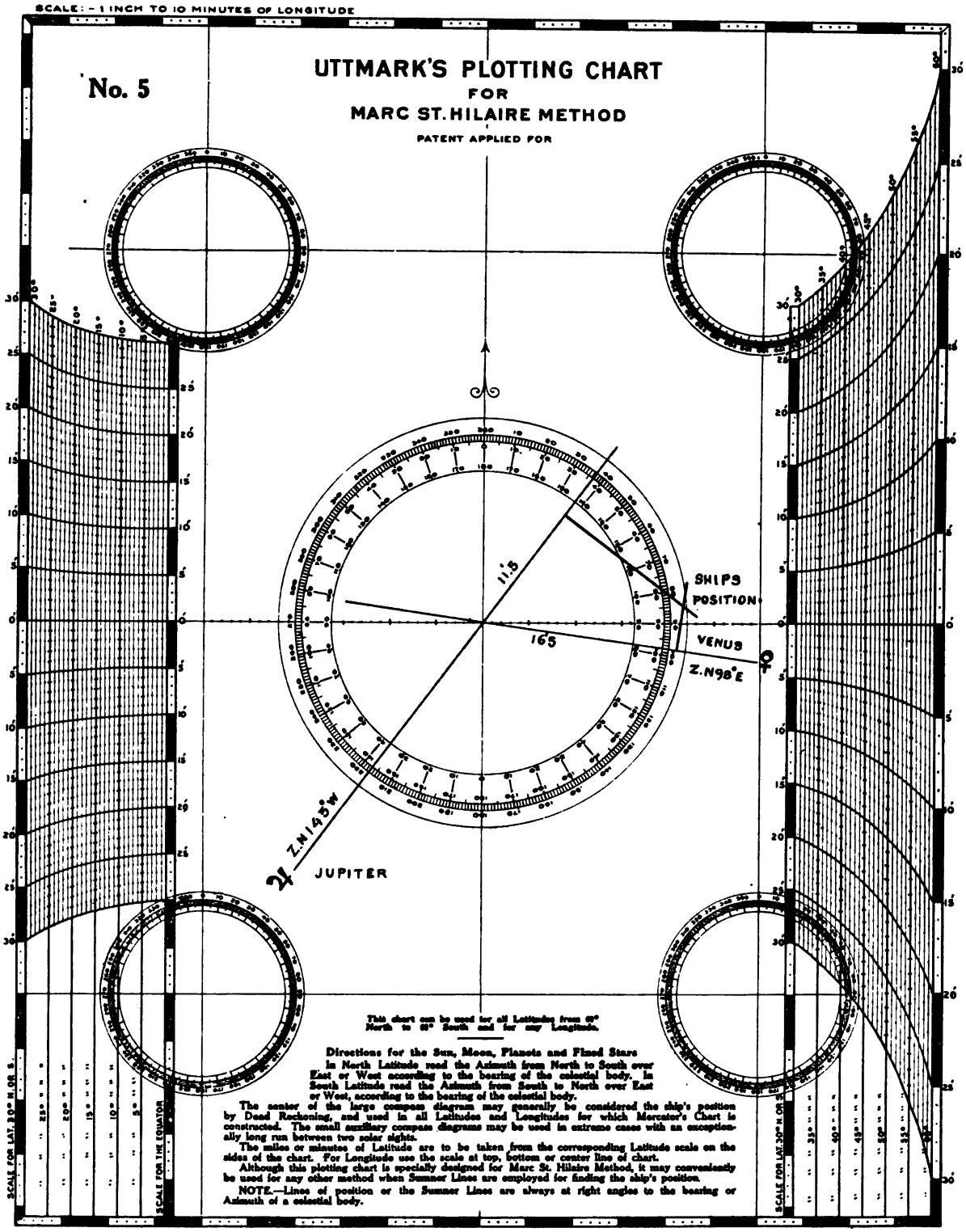
Required the Latitude and Longitude of the ship.

Venus corrected Declination = 18° 12′ 47″ N.
Venus corrected R. A. = 7h 03m 27s.
Mean Sun's R. A. = 9h 57m 54s.
Correction for R. A. = + 3m 32s.
Jupiter corrected Declination = 12° 00′ 12″ N.
Jupiter corrected R. A. = 2h 14m 18s.

Position Venus East				Compass Bearing			
Chronometer	21h	33m	52s	Obs. Alt.....	39°	18′	30″
Rate			0	Correction ....—		7′	18″
G. M. T.....	21	33	52	True Alt.....	39°	11′	12″
Longitude in Time ...W—	4	09	00				
M. T. S.....	17	24	52				
R. A. M. S...	9	57	54				
Correction...		3	32				
L. S. T.....	27	26	18				
♀ R. A.....	7	03	27				
H. A. (t).....	20h	22m	51s	Log. Hav.....			9.31836
Latitude	38°	42′	00″ N	Log. Cos.....			9.89233
Declination..	18°	12′	47″ N	Log. Cos.....			9.97768
				Log. Hav.....			9.18837
				Nat. Hav.....			.15430
Lat. — Decl..	20°	29′	13″	Nat. Hav.....			.03163
Zenith Dist..	51°	05′	15″	Nat. Hav.....			.18593
Sub. from 90°	89°	59′	60″				
Com.Alt.(hc)	38°	54′	45″				
True Alt.(h t)	39°	11′	12″				
Intercept ....+		16′	27″	Go to 16′.5 True Azimuth (Z) N. 98° E. or 98°.			

Position Jupiter West				Compass Bearing			
Chronometer	21h	35m	43s	Obs. Alt.....	58°	35′	00″
Rate			0	Correction ....—		6′	41″
G. M. T.....	21	35	43	True Alt.	58°	28′	19″
Longitude in Time ...W—	4	09	00				
M. T. S.....	17	26	43				
R. A. M. S...	9	57	54				
Correction .		3	33				
L. S. T.....	27	28	10				
2ℓ R. A.....	2	14	18				
H. A. (t).....	1h	13m	52s	Log. Hav.....			8.41071
Latitude	38°	42′	00″ N	Log. Cos.....			9.89233
Declination..	12°	00′	12″ N	Log. Cos.....			9.99040
				Log. Hav.....			8.29344
				Nat. Hav.....			.01965
Lat. — Decl.	26°	41′	48″	Nat. Hav.....			.05331
Zenith Dist..	31°	20′	15″	Nat. Hav.....			.07295
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	58°	39′	45″				
True Alt.(h t)	58°	28′	19″				
Intercept ...+		11′	26″	Go away 11′.5 True Azimuth (Z) N. 143° W. or 217°.			

Latitude ..... 38° 43′½ N
Longitude ..... 61° 53′¼ W
} Astronomical Fix.


SCALE:- 1 INCH TO 10 MINUTES OF LONGITUDE
No. 5
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
11.5
16.5
SHIPS POSITION
VENUS
Z.N98°E
Z.N145°W
JUPITER
This chart can be used for all Latitudes from 0° North to 60° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Summer Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Summer Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 0° N. OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N. OR S.
INVENTED BY CAPT. FRITZ E UTTMARK, UTTMARKS NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 6

October 2, 1916, early in the morning. Latitude by D. R. 28° 15′ N., longitude 78° 10′ W. Observed altitude of alpha Argus (Canopus) 9° 9′ bearing South. Chronometer 22h 42m 42s; later got a sight of the planet ♀ (Venus) East of the meridian, the observed altitude being 44° 50′. Chronometer 23h 10m 00s. Height of eye 34 feet. Chronometer slow of G. M. T. 46 seconds for both observations. Ship being stationary between sights.

Note.—The star Canopus being close to the meridian, therefore compute altitude using Table 26-27 Bowditch.

Canopus Decl. at sight 52° 38′ 36″ S.
Canopus R. A. at sight 6h 22m 07s.
Venus Decl. at sight 13° 02′ 30″.
Venus R. A. at sight 9h 44m 39s.
M. S. R. A. at Gr. noon 12h 39m 32s.
Corr. for time of obs. + 3m 48s.
Required the position of ship.

Position Canopus South			
Chr. Oct. 1d..	22h	42m	42s
Rate .....+			46
G. M. T.....	22	43	28
Longitude in Time ...W—	5	12	40
M.T.S.Oct. 1d	17	30	48
R. A. M. S...	12	39	32
Correction...		3	48
L.S.T. Oct. 2d	06	14	08
★ R. A.....	6	22	7
H. A. (t).....	23h	52m	1s

Lat. D. R....	28°	15′	00″ N
Declination..	52°	38′	36″ S
Zenith Dist..	80°	53′	36″
Sub. from 90°	89°	59′	60″
Com.Alt.(h c)	9°	06′	24″
True Alt.(h t)	8°	58′	30″
Intercept ....—		7′	54″

Compass Bearing			
Obs. Alt.....	9°	09′	00″ S
Correction...		11′	30″
True Alt.....	8°	57′	30″ S
Augm. for 8m.		1′	0″
True Mer. Alt.	8°	58′	30″

Away 7′.9 True Azimuth (Z) 180°.

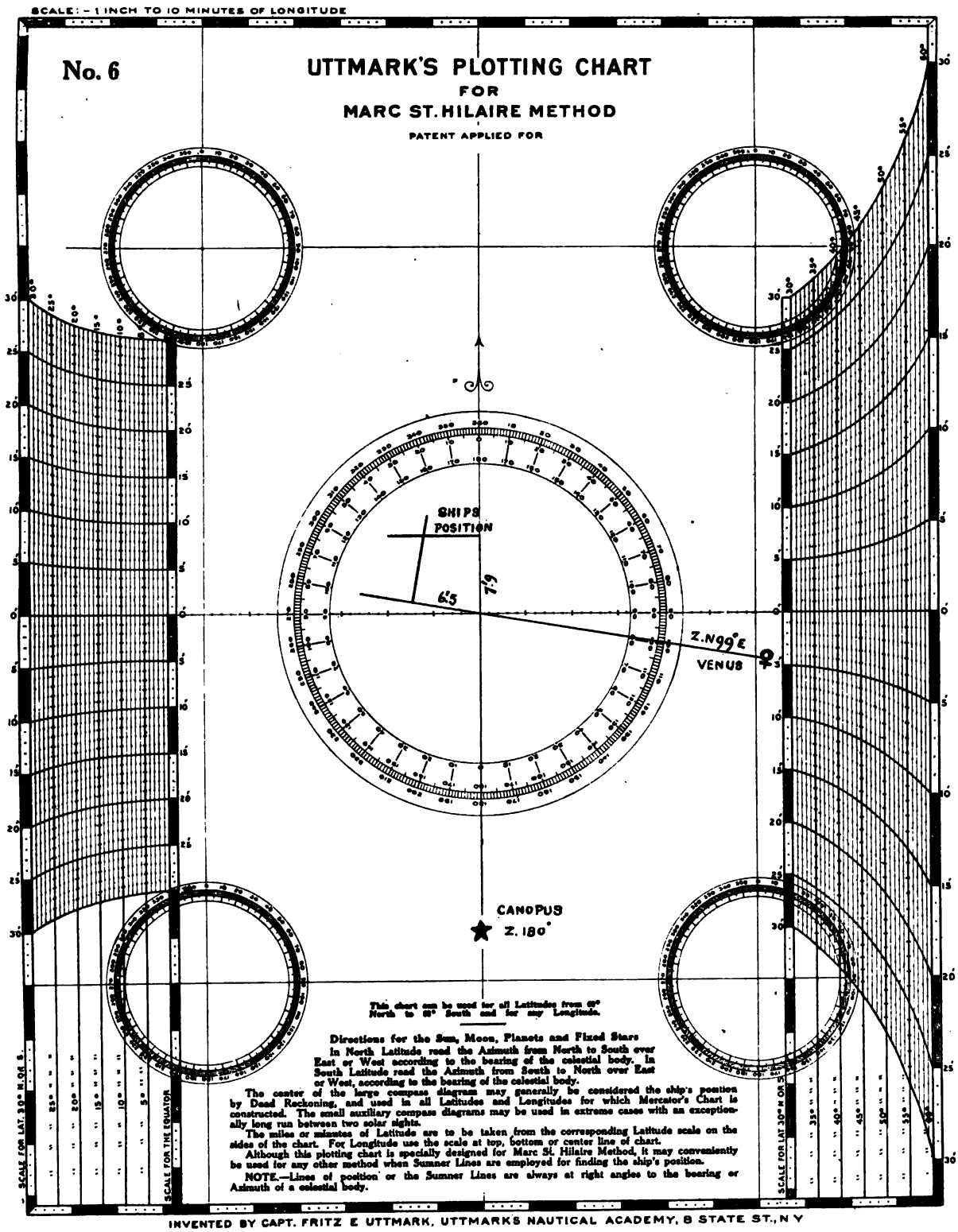
Position Venus East			
Chronometer	23h	10m	00s
Rate .....+			46
G. M. T.....	23	10	46
Longitude in Time ...W—	5	12	40
M. T. S.....	17	58	06
R. A. M. S...	12	39	32
Correction...		3	48
L. S. T.....	30	41	26
♀ R. A.....—	9	44	39
H. A. (t)....	20h	56m	47s
Latitude	28°	15′	00″ N
Declination..	13°	02′	30″ N
Lat. + Decl.	15°	12′	30″
Zenith Dist..	45°	10′	00″
Sub. from 90°	89°	59′	60″
Com.Alt.(h c)	44°	50′	00″
True Alt. (h t)	44°	43′	26″
Intercept ...	—	6′	34″

Compass Bearing N. 105° E.			
Obs. Alt.....	44°	50′	00″
Correction.....—		6′	34″
True Alt.....	44°	43′	26″

Log. Hav.....	9.18025
Log. Cos.....	9.94492
Log. Cos.....	9.98865
Log. Hav.....	9.11382
Nat. Hav.....	.12996
Nat. Hav.....	.01751
Nat. Hav.....	.14747

Go away 6.′5 True Azimuth (Z) N 99° E. or 99°.

Latitude .....28° 23′ N.
Longitude .....78° 16′ W. } Astronomical fix at sight.


SCALE:- 1 INCH TO 10 MINUTES OF LONGITUDE
No. 6
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
SHIPS POSITION
6'5
7'9
Z.N99°E
VENUS
CANOPUS
Z. 180°
This chart can be used for all Latitudes from 65° North to 65° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 30° N. OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N. OR S.
INVENTED BY CAPT. FRITZ E UTTMARK, UTTMARKS NAUTICAL ACADEMY, 8 STATE ST., N Y

Problem No. 7

April 11, 1918, A. M. at ship, in latitude 40° 20′ N., longitude 70° 14′ W. Observed altitude of the sun's lower limb 21° 24′ 30″. Chronometer 00h 10m 15s P. M. Ship then ran on a true course S. 60° E. 28 miles and again observed altitude of the sun's lower limb 42° 10′ 30″. Chronometer 2h 4m 30s. P. M. Chronometer fast 1m 39s of G. M. T. Height of eye, 28 feet.

Required the ship's position at second observation.

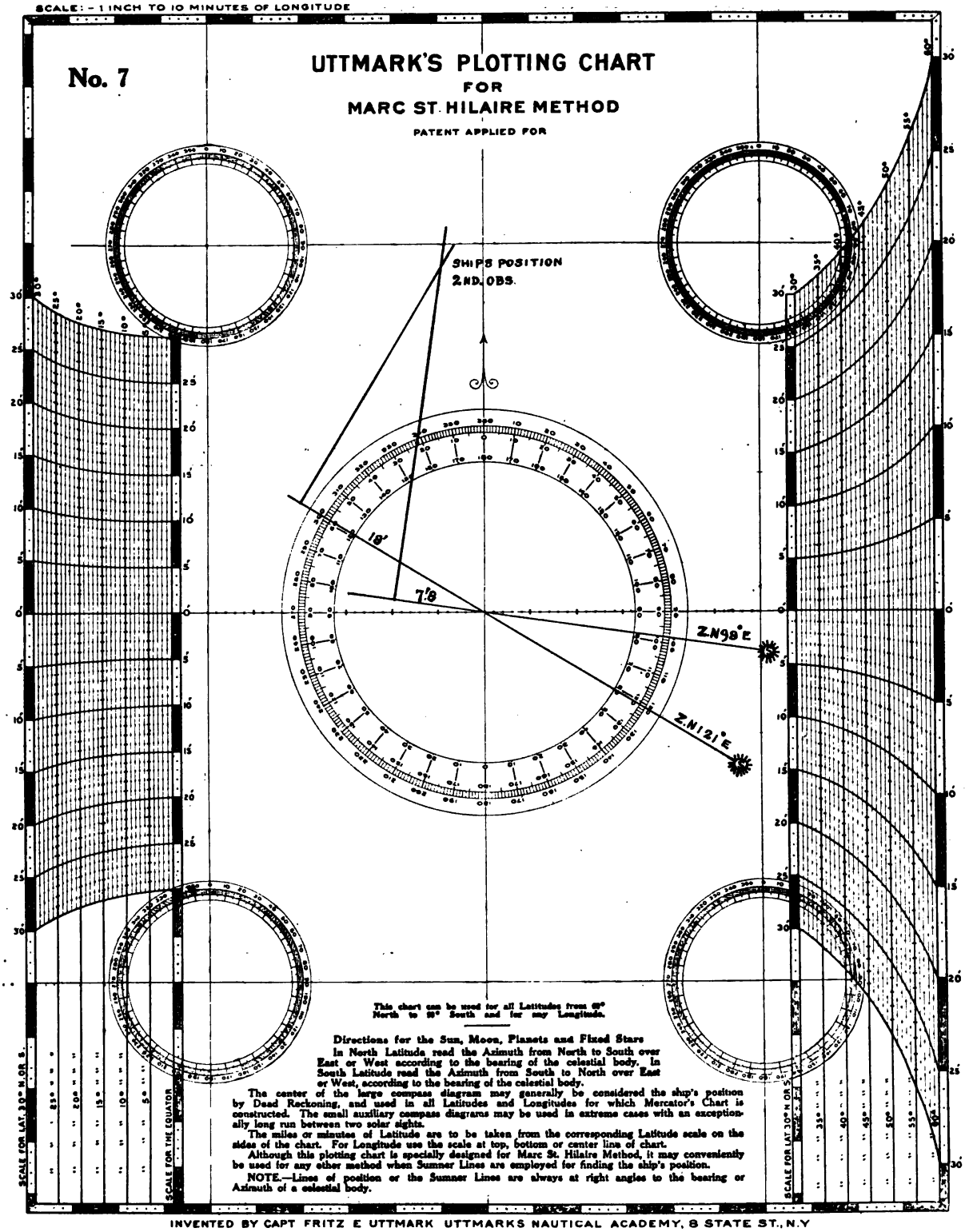
Latitude D. R. at second sight 40° 06′ N.

Longitude D. R. at second sight 69° 42′ W.

First Position Sun East				Compass Bearing N 85° E.			
Chr. Apr. 11d	0h	10m	15s	Obs.Alt. S. L. L.	21°	24′	30″
Rate .....—		1	39	Correction	+	8′	30″
G. M. T.....	0	08	36	True Alt.....	21°	33′	00°
Eq. T.....—		1	13				
G. A. T. 11d.	0	07	23				
Longitude W—	4	40	56				
H. A. (t).....	19h	26m	27s	Log. Hav.....			9.49946
Latitude	40°	20′	00″ N	Log. Cos.....			9.88212
Declination..	8°	07′	12″ N	Log. Cos.....			9.99563
				Log. Hav.....			9.37721
				Nat. Hav.....			.23835
Lat. — Decl..	32°	12′	48″	Nat. Hav.....			.07696
Zenith Dist..	68°	19′	15″ N	Nat. Hav.....			.31531
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	21°	40′	45″				
True Alt. (h t)	21°	33′	00″				
Intercept ....—		7′	45″	Go away 7′.8 True Azimuth (Z) N 98° E or 98°.			

Second Position Sun East				Compass Bearing			
Chronometer	2h	04m	30s	Obs. Alt.....	42°	10′	30″
Rate .....—		1	39	Correction ....+		9′	50″
G. M. T.....	2	02	51	True Alt.....	42°	20′	20″
Eq. T.....—		1	12				
G. A. T.....	2	1	39				
Longitude W—	4	38	48				
H. A. (t).....	21h	22m	51s	Log. Hav.....			9.05312
Latitude	40°	06′	00″ N	Log. Cos.....			9.88362
Declination..	8°	08′	54″ N	Log. Cos.....			9.99559
				Log. Hav.....			8.93233
				Nat. Hav.....			.08557
Lat. — Decl.	31°	57′	06″	Nat. Hav.....			.07575
Zenith Dist...	47°	21′	45″	Nat. Hav.....			0.16132
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	42°	38′	15″				
True Alt.(h t)	42°	20′	20″				
Intercept ....—		17′	55″	Go away 18′ True Azimuth (Z) N 121° E or 121°.			

Latitude ..... 40° 34′ N
Longitude ..... 69° 47′ W
} Astronomical fix at 2nd observation.


SCALE:- 1 INCH TO 10 MINUTES OF LONGITUDE
No. 7
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
SHIPS POSITION
2ND. OBS.
18'
7'8
Z.N98°E
Z.N121°E
This chart can be used for all Latitudes from 69° North to 69° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 30° N OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N OR S.
INVENTED BY CAPT FRITZ E UTTMARK UTTMARKS NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 8

May 12, 1918, A. M. at ship. In latitude 38° 15′ N., longitude 136° 00′ E. by D. R. Observed altitude of sun's lower limb 33° 12′ 00″. Chronometer 10h 46m 00s. P. M. Ship then sailed N. 48° E., 31 miles and again observed altitude of the sun's lower limb 63° 20′ 00″. Chronometer 1h 31m 00s. A. M. Height of eye, 40 feet. Chronometer slow 2m 20s of G. M. T.

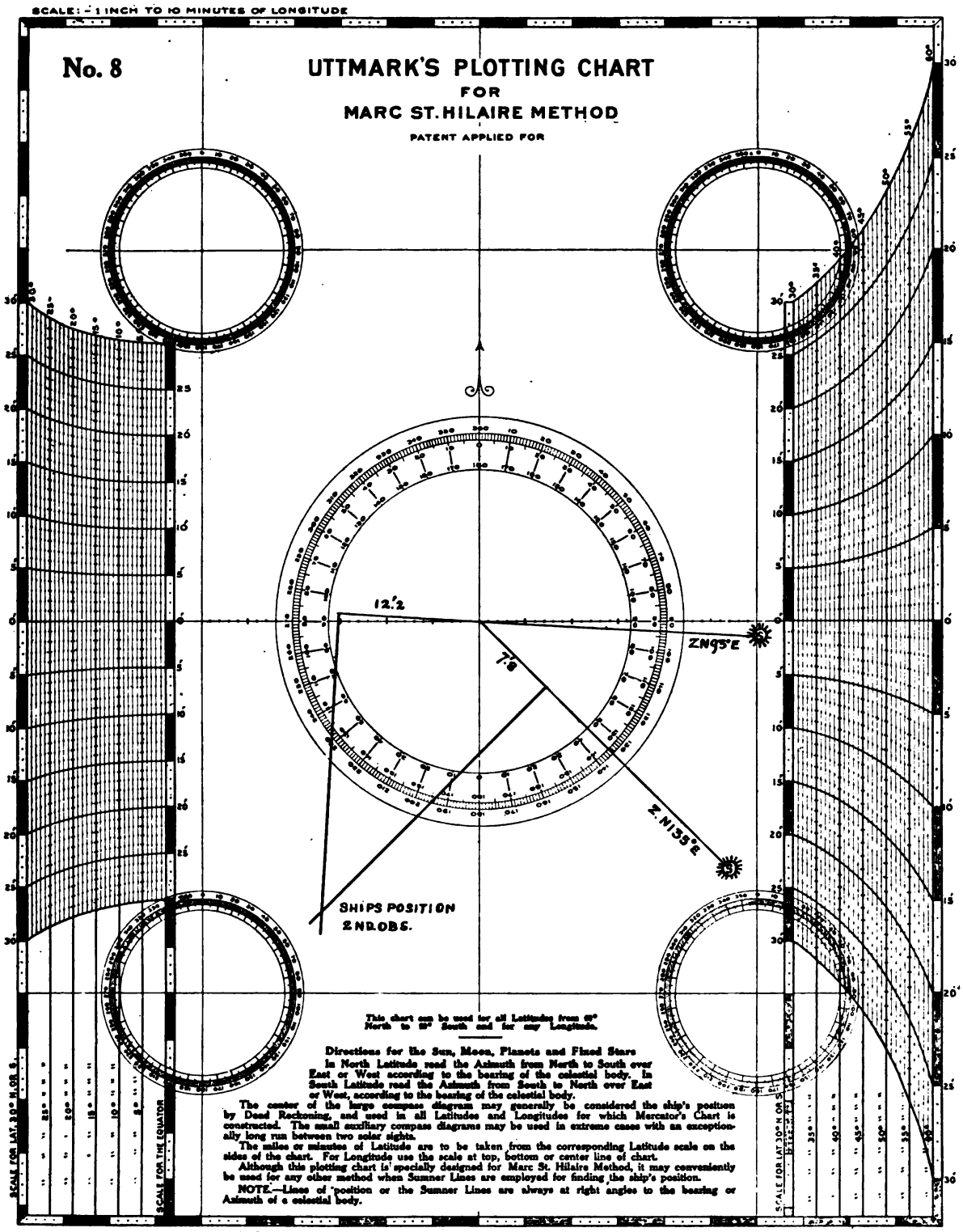
D. R. Position at second obs. { Lat. 38° 35′ 42″ N. / Long. 136° 29′ E.

Required the ship's true position at the 2nd observation.

Position by Sun East		Compass Bearing	
Chronometer	10h 46m 00s	Obs. Alt.....	33° 12′ 00″
Rate .....+	2 20	Correction ....+	8′ 20″
G. M. T. (11d)	10 48 20	True Alt.....	33° 20′ 20″
Eq. T. .....+	3 46		
G. A. T.....	10 52 06		
Longitude E+	9 04 00		
H. A. (t)....	19h 56m 06s	Log. Hav.....	9.41062
Latitude	38° 15′ 00″ N	Log. Cos.....	9.89504
Declination..	17° 51′ 24″ N	Log. Cos.....	9.97855
		Log. Hav.....	9.28421
		Nat. Hav.....	.19240
Lat. — Decl..	20° 23′ 36″	Nat. Hav.....	.03133
Zenith Dist..	56° 27′ 30″	Nat. Hav.....	.22373
Sub. from 90°	89° 59′ 60″		
Com.Alt.(h c)	33° 32′ 30″		
True Alt.(h t)	33° 20′ 20″		
Intercept ....—	12′ 10″	Go away 12′.2 True Azimuth (Z) N 93° E or 93°.	

2nd Position by Sun East		Compass Bearing	
Chronometer..	13h 31m 00s	Obs. Alt.	63° 20′ 00″
Rate .....+	2 20	Correction ....+	9′ 17″
G. M. T.....	13 33 20	True Alt.	63° 29′ 17″
Eq. T. .....+	3 46		
G. A. T.....	13 37 06		
Longitude E+	9 05 56		
H. A. (t)....	22h 43m 02s	Log. Hav.....	8.44610
Latitude	38° 35′ 42″ N	Log. Cos.....	9.89297
Declination..	17° 53′ 06″ N	Log. Cos.....	9.97849
		Log. Hav.....	8.31756
		Nat. Hav.....	.02078
Lat. — Decl..	20° 42′ 36″..	Nat. Hav.....	.03230
Zenith Dist.	26° 38′ 30″	Nat. Hav.....	.05308
Sub. from 90°	89° 59′ 60″		
Com.Alt.(h c)	63° 21′ 30″		
True Alt.(h t)	63° 29′ 17″		
Intercept ....+	7′ 47″	Go to 7′.8 True Azimuth (Z) N 135° E or 135°.	

Latitude ..... 38° 11′½ N } Astronomical fix of ship at 2nd
Longitude .....136° 12′ E } Observation.


SCALE: - 1 INCH TO 10 MINUTES OF LONGITUDE
No. 8
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
12.2
Z.N95°E
7.9
Z.N139°E
SHIPS POSITION
2ND OBS.
This chart can be used for all Latitudes from 89° North to 89° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 30° N OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N OR S.
INVENTED BY CAPT. FRITZ E. UTTMARK, UTTMARKS NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 9

April 21, 1918, P. M. at ship. In latitude by D. R. 59° 40′ N., longitude 45° 10′ 00″ W. Observed altitude of the sun's lower limb 23° 50′ 00″. Chronometer 7h 10m 40s P. M. Ship then sailed on a true course S. 40° W., 34 miles and again observed altitude of the sun's lower limb 5° 30′ 00″. Chronometer 9h 40m 40s. P. M. Height of eye, 18 feet. Chronometer fast of G. M. T. 3 m 10s.

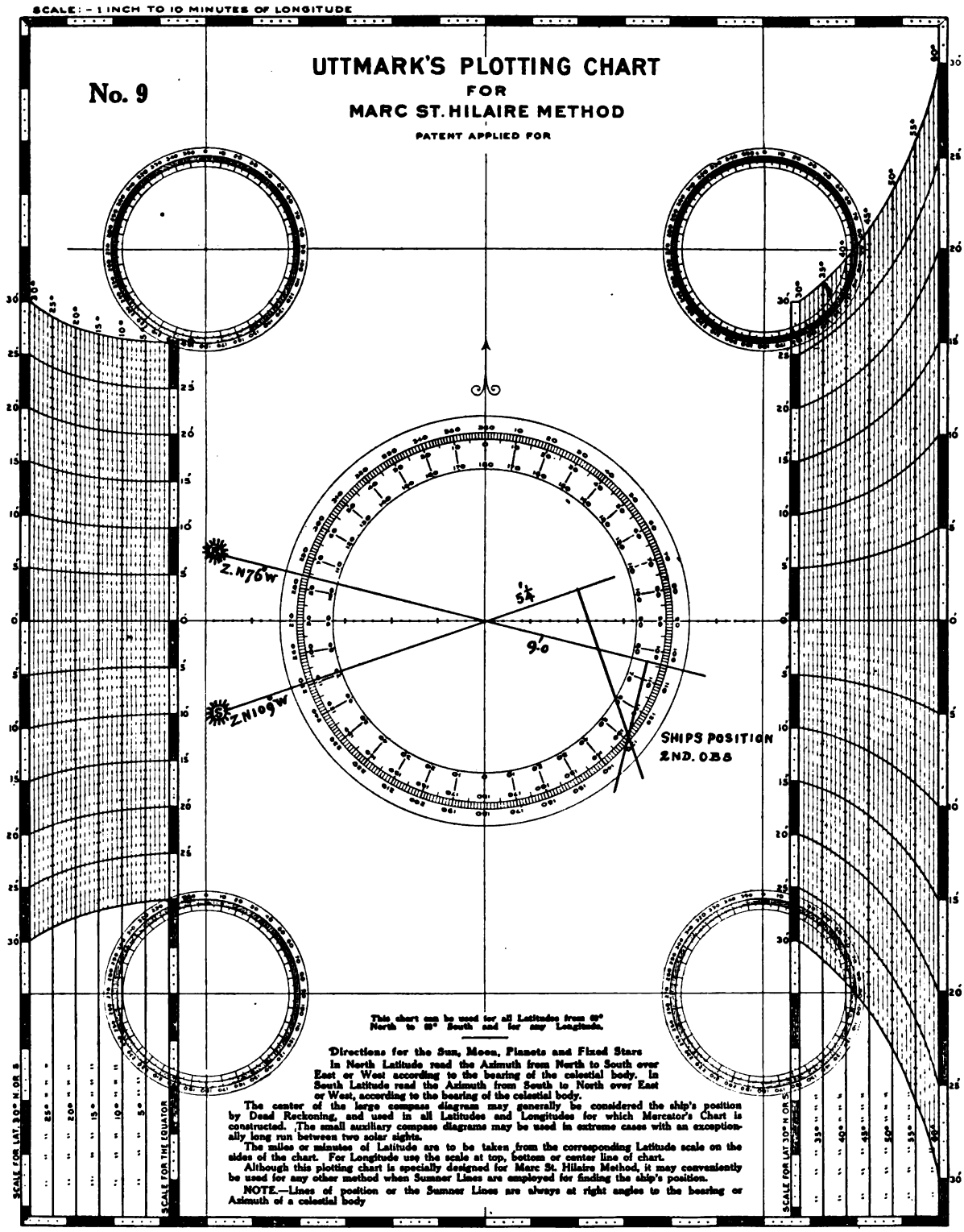
Required the ship's true position at second observation.

D. R. Second Obs. { Lat. = 59° 14′ 00″ N. / Long. = 45° 54′ 00″ W.

1st Position Sun West				Compass Bearing			
Chr. 21d	7h	10m	40s	Obs. Alt.....	23°	50′	00″
Rate .....—		3	10	Correction ....+		9′	45″
G. M. T.	7	07	30	True Alt.....	23°	59′	45″
Eq. T. .....+		1	15				
G. A. T.....	7	08	45				
Longitude W—	3	00	40				
H. A. (t)....	4h	08m	05s	Log. Hav.....			9.42394
Latitude	59°	40′	00″ N	Log. Cos.....			9.70332
Declination..	11°	46′	24″ N	Log. Cos.....			9.99077
				Log. Hav.....			9.11803
				Nat. Hav.....			.13124
Lat. — Decl..	47°	53′	36″	Nat. Hav.....			.16472
Zenith Dist.	65°	55′	00″	Nat. Hav.....			.29596
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	24°	05′	00″				
True Alt. (h t)	23°	59′	45″				
Intercept ....+		5′	15″	Go away 5′¼ True Azimuth (Z) N 109° W or 251°.			

2nd Position Sun West				Compass Bearing			
Chr. 21d	9h	40m	40s	Obs. Alt.	5°	30′	00″
Rate .....—		3	10	Correction .....+		2′	43″
G. M. T.	9	37	30	True Alt.	5°	32′	43″
Eq. T. .....+		1	17				
G. A. T.....	9	38	47				
Longitude W—	3	03	36				
H. A. (t)....	6h	35m	11s	Log. Hav.....			9.76077
Latitude	59°	14′	00″ N	Log. Cos.....			9.70888
Declination..	11°	48′	30″ N	Log. Cos.....			9.99070
				Log. Hav.....			9.46035
				Nat. Hav.....			.28864
Lat. — Decl..	47°	25′	30″	Nat. Hav.....			.16172
Zenith Dist.	84°	18′	15″	Nat. Hav.....			.45036
Sub. from 90°	89°	59′	60″				
Com.Alt.(h c)	5°	41′	45″				
True Alt. (h t)	5°	32′	43″				
Intercept .+		9′	02″	Go away 9′ True Azimuth (Z) N 76° W or 284°.			

Latitude ..... 59° 7′¾ N
Longitude ..... 45° 38′½ W
} Astronomical fix at 2nd observation.


SCALE: - 1 INCH TO 10 MINUTES OF LONGITUDE
No. 9
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
Z.N76W
Z.N109W
54
90
SHIPS POSITION
2ND. OBS
This chart can be used for all Latitudes from 0° North to 0° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body
SCALE FOR LAT. 30° N. OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N. OR S.
INVENTED BY CAPT. FRITZ E UTTMARK. UTTMARKS NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 10

At noon, May 14, 1916. In latitude by D. R. 38° 25′ N., longitude 73° 18′ W. Observed altitude of the planet ♀ (Venus) 49° 04′, East of the meridian. Chronometer 4h 45m 11s P. M. Immediately after observed meridian altitude of the sun's lower limb 70° 17′ S. Chronometer 2m 00s slow. Height of eye, 41 feet.

Required the true position of the ship.

♀ (Venus) Corr. decl.	26°	51′	00″ N.
♀ (Venus) Corr. R. A.	6h	32m	16s
M. S. R. A. at Gr. Noon	3h	27m	35s
Corr. for time of obs.	+	0m	47s

Position Venus East

Chr. 14d	4h	45m	11s
Rate .....+		2	00
G. M. T. (14d)	4	47	11
Longitude in Time ...W—	4	53	12
M. T. S. 13d..	23	53	59
R. A. M. S...	3	27	35
Correction ..+			47
L. S. T. 14d..	3	22	21
♀R. A. .....—	6	32	16
H. A. (t)....	20h	50m	05s
Latitude	38°	25′	00″ N
Declination..	26°	51′	00″ N
Lat. — Decl..	11°	34′	00″
Zenith Dist.	41°	08′	30″
Sub. from 90°	89°	59′	60″
Com.Alt.(h c)	48°	51′	30″
True Alt.(h t)	48°	56′	54″
Intercept ...+		5′	24″

Compass Bearing

Obs. Alt.....	49°	04′	00″
Correction ....—		7′	06″
True Alt.....	48°	56′	54″

Log. Hav.....	9.20971
Log. Cos.....	9.89405
Log. Cos.....	9.95046
Log. Hav.....	9.05422
Nat. Hav.....	.11330
Nat. Hav.....	.01015
Nat. Hav.....	.12345

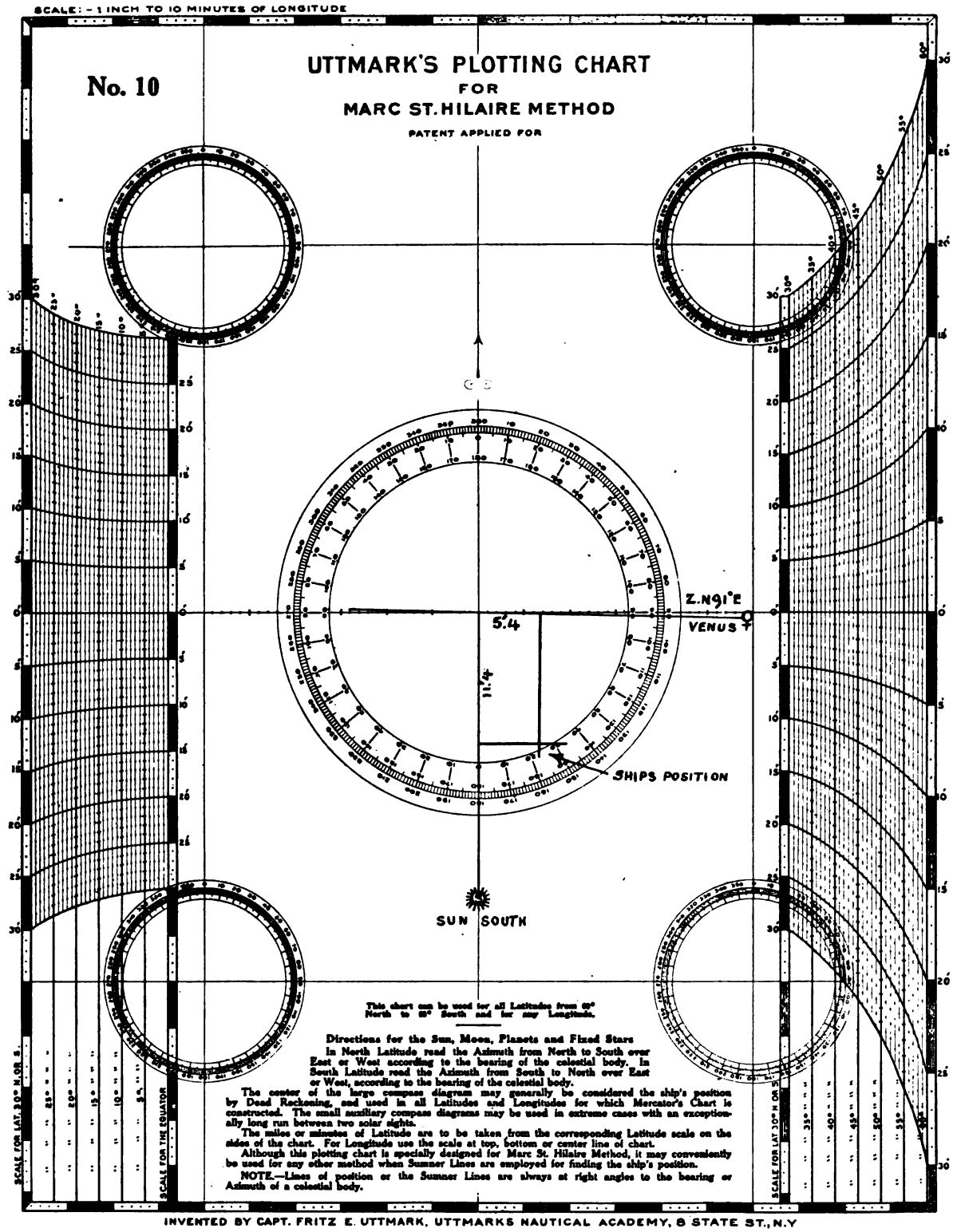
Go to 5′.4 True Azimuth (Z) N 91° E or 91°.

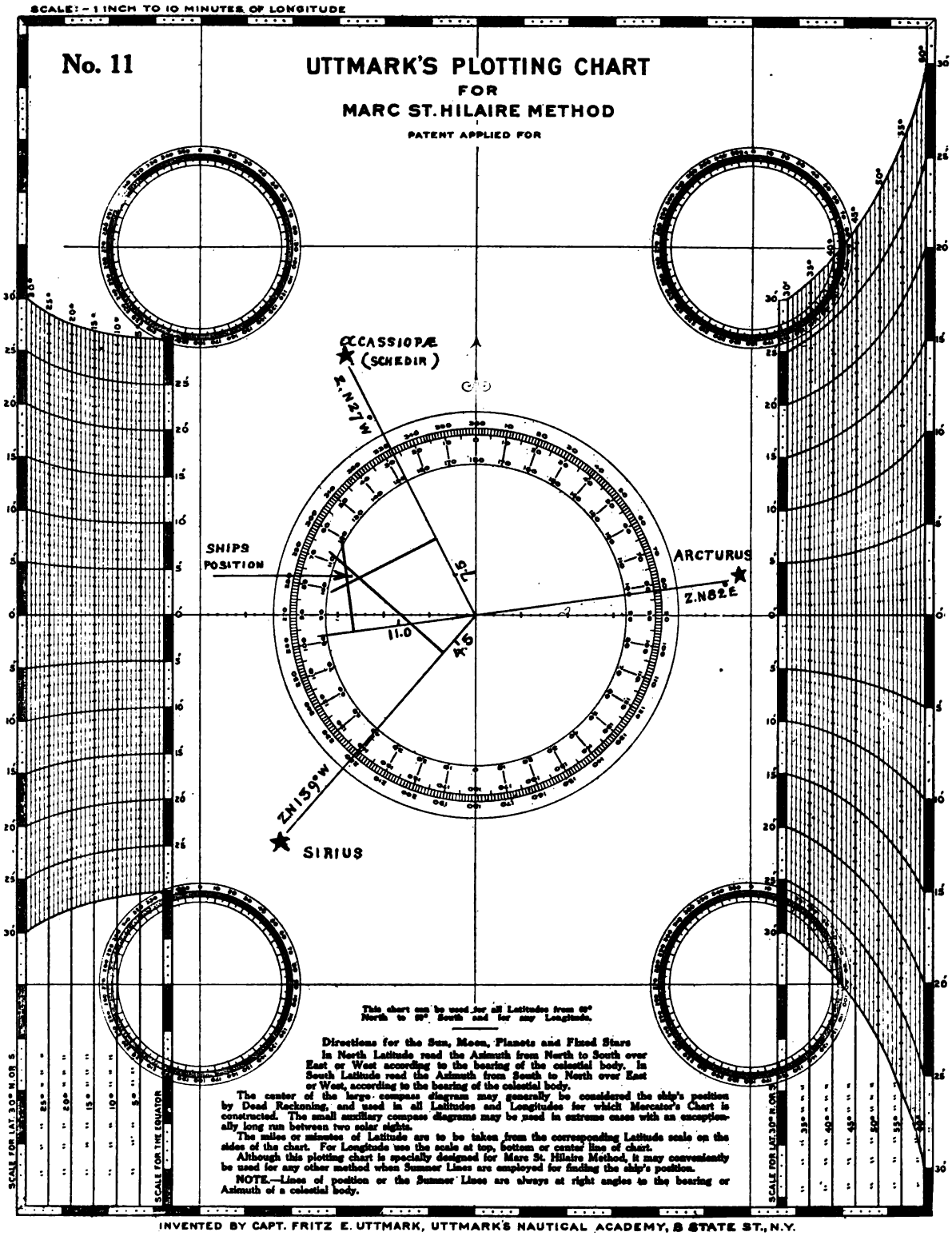
Lat. by D. R.	38°	25′	00″ N
Sun's Decl.	18°	39′	54″ N
Comp. Z. D...	19°	45′	06″ N
	90°	00′	00″
Comp. Alt....	70°	14′	54″ S
Sun's T. Alt..	70°	26′	18″ S
Intercept ....+		11′	24″

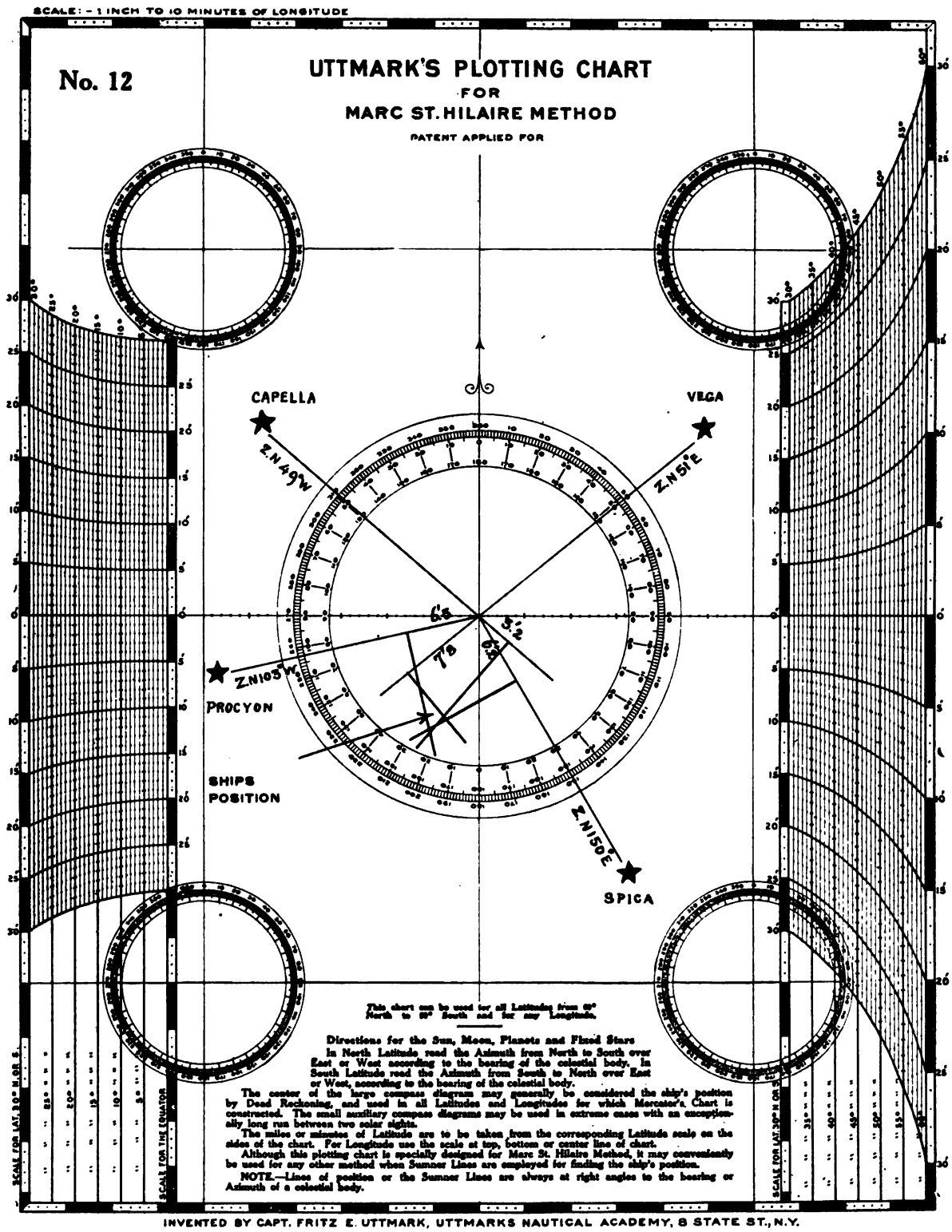
Obs.Alt.S.'s L.L.	70°	17′	00″
Correction ....+		9′	18″
Sun's True Alt.	70°	26′	18″

Go to 11′.4 Sun's True Azimuth South or 180°.

Latitude .....38° 13′½ N.
Longitude .....73° 12′½ W. } Astronomical fix.


SCALE: - 1 INCH TO 10 MINUTES OF LONGITUDE
No. 10
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
Z.N91°E
VENUS
5.4
11.4
SHIPS POSITION
SUN SOUTH
This chart can be used for all Latitudes from 69° North to 69° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 30° N. OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N. OR S.
INVENTED BY CAPT. FRITZ E. UTTMARK, UTTMARKS NAUTICAL ACADEMY, 8 STATE ST., N.Y.


SCALE:- 1 INCH TO 10 MINUTES OF LONGITUDE
No. 11
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
CASSIOPÆ
(SCHEDIR)
Z.N27°W
SHIPS
POSITION
ARCTURUS
Z.N82°E
11.0
Z.N139°W
SIRIUS
SCALE FOR LAT. 30° N. OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N. OR S.
This chart can be used for all Latitudes from 65° North to 65° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Summer Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Summer Lines are always at right angles to the bearing or Azimuth of a celestial body.
INVENTED BY CAPT. FRITZ E. UTTMARK, UTTMARK'S NAUTICAL ACADEMY, 8 STATE ST., N.Y.


SCALE: - 1 INCH TO 10 MINUTES OF LONGITUDE
No. 12
UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
CAPELLA
Z.N 49W
VEGA
Z.N 51E
Z.N 103W
PROCYON
SHIPS POSITION
Z.N 105E
SPICA
This chart can be used for all Latitudes from 65° North to 65° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.
SCALE FOR LAT. 30° N OR S.
SCALE FOR THE EQUATOR
SCALE FOR LAT. 30° N OR S.
INVENTED BY CAPT. FRITZ E. UTTMARK, UTTMARKS NAUTICAL ACADEMY, 8 STATE ST., N.Y.

Problem No. 11

SIMULTANEOUS OBSERVATIONS OF 3 STARS

Feb. 1, about 0h 30m A. M., in Lat. by D. R. 36° 10′ N. Long. by D. R. 9° 40′ W. Took simultaneous observations of the following stars:

★Alpha Cassiopea (Schedir) obs. altitude 12° 29′ bearing West. Chron. time 1h 07m 08s A. M.

★Alpha Bootis (Arcturus) obs. altitude 22° 50′ bearing East. Chron. time 1h 08m 13s A. M.

★Alpha Canis Majoris (Sirius) obs. altitude 26° 45′ bearing West. Chron. time 1h 09m 06s A. M. Chron. fast 1m 20s for all observations.

Height of eye 45 feet.

Required position of ship.

Answer.—Lat. 36° 13′ 30″ North. Long. 9° 53′ 30″ West.

Problem No. 12

SIMULTANEOUS OBSERVATIONS OF 4 STARS

On May 19, 1918, about 7:50 P. M., at ship in Lat. D. R. 37° 50′ N. Long. by D. R. 74° 00′ W. Simultaneous observations were taken of the following stars:

★Capella 22° 19′ 30″ bearing West. Chron. time 00h 46m 16s A. M.

★Vega, 13° 33′ bearing East. Chron. time 00h 47m 31s A. M.

★Spica 36° 16′ 40″ bearing East. Chron. time 00h 50m 10s A. M.

★Procyon 25° 42′ 00″ bearing West. Chron. time 00h 51m 47s A. M.

Chronometer fast 1m 06s for all observations.

Height of eye 41 feet.

Required position of ship.

Answer.—Lat. 37° 42′ North. Long. 74° 05′ West.

Problem No. 13

On January 20, 1918, A. M., at ship in Lat. by D. R. 27° 58′ N. Long. 91° 15′ W. Observed altitude of the sun's lower limb 12° 27′ 30″. Height of eye 40 feet. Chronometer 2h 03m 20s P. M. Chronometer slow 1m 19s. The ship then sailed S. 64° E. true, 48 miles.

Again observed altitude of sun's lower limb 40° 02′ 30″. Height of eye 40 feet. Chronometer 5h 15m 20s P. M. Chronometer slow 1m 19s.

Required position of ship.

Answer.—Lat. 27° 47½′ N.. Long. 90° 13¼′ W.

Problem No. 14

February 28, 1918, A. M., at ship in Lat. 28° 39′ 36″ N. and Long. 79° 50′ W. by D. R. Observed altitude of the sun's lower limb 15° 20′ 20″. Height of eye 40 feet. Chronometer 1h 01m 56s P. M. Chronometer slow 11s. The ship then sailed N. 5° E. true, 60 miles. Again observed altitude of the sun's lower limb 49° 23′. Height of eye 40 feet. Chronometer 4h 31m 56s P. M. Chronometer slow 0m 11s.

Required position of ship.

Answer.—Lat. 29° 49½′ N. Long. 79° 32′ W.

Problem No. 15

On July 10, 1918, between Diamond Shoal and Jupiter Inlet in Lat. by D. R. 31° 40′ N. Long. 76° 25′ W. Observed altitude of the sun's lower limb 17° 40′ 50″. Height of eye 40 feet. Chronometer 11h 40m 30s A. M. Chronometer slow 1m 13s.

Ship then sailed S. 35° W. true, 60 miles. Observed altitude of the sun's lower limb 67° 49′ 30″. Height of eye 40 feet. Chronometer 3h 40m 32s P. M. Chronometer slow 1m 13s.

Required position of ship.

Answer.—Lat. 30° 37′ N. Long. 77° 00′ 30″ W.

Problem No. 16

In the morning of June 28, 1916, in Lat. by D. R. 46° 00′ N. Long. 180° 00′. Observed the altitude of sun's lower limb 46° 54′. Chronometer 8h 55m 20s P. M. (June 28, Greenwich date). Chron. slow 5m 20s. Height of eye 20 feet.

About 2 P. M. same day again observed altitude sun's lower limb 56° 50′ 40″. Chronometer 1h 55m 20s A. M. Chron. slow 5m 20s. Dip for 20 feet.

Between the two observations the ship sailed S. 15° E. (true) 32 miles.

Required ship's position at second observation.

Answer.—Lat. 45° 43½′ N. Long. 179° 31′ 00″ W.

Problem No. 17

August 2, 1918, running between Barnegat and Cape Hatteras about 6.30 A. M. in Lat. by D. R. 37° 29′ N. and Long. by D. R. 74° 33′ 30″ W. Observed altitude of sun's lower limb 16° 47′ 40″. Chron. 11h 34m 01s A. M. Chron. slow 1m 17s. The ship then runs S. 15° W. true, 60 miles; again observed altitude of sun's lower limb 62° 44′. Chron. 3h 33m 54s P. M. Chron. slow 1m 17s. Height of eye 40 feet.

Required ship's true position, at second observation.

Answer.—Lat. 36° 24½′ N. Long. 74° 43½′ W.

Problem No. 18

October 23, 1918, A. M. at ship, between Barnegat and Diamond Shoals, in Lat. 37° 01′ N. and Long. 74° 45′ 30″ W. by D. R. Observed altitude of the sun's lower limb 9° 25′ 50″. Chronometer 0h 07m 42s P. M. Ship sails S. 14° W., true, 48 miles and again observed altitude of sun's lower limb 38° 36′ 10″. Chronometer 3h 20m 31s P. M. Chron. rate 1m 22s slow. Height of eye 40 feet.

Required position of ship at second observation.

Answer.—Lat. 35° 59½′ N. Long. 75° 22′ W.

Datas from Nautical Almanac Given for Problems Nos. 11 to 18, Inclusive

No. 11. Jan. 31, 1918, G. M.T. Noon.

M. S. R. A.						20h	39m	35s
Corr. for time past noon Table III.					+		2m	09s
★ Schedir	decl.	56°	05′	16″	N.	R. A. 0h	35m	51s
★ Arcturus	decl.	19°	36′	12″	N.	R. A. 14h	11m	57s
★ Sirius	decl.	16°	36′	24″	S.	R. A. 6h	41m	34s

No. 12. May 19, 1918, G. M. T. Noon.

M. S. R. A.						3h	45m	23s
Corr. for time past noon Table III.					+		2m	06s
★ Capella	decl.	45°	55′	00″	N.	R. A. 5h	10m	39s
★ Vega	decl.	38°	42′	12″	N.	R. A. 18h	34m	12s
★ Spica	decl.	10°	44′	18″	S.	R. A. 13h	20m	55s
★ Procyon	decl.	5°	26′	00″	N.	R. A. 7h	35m	02s

No. 13. Jan. 20, 1918, G. M. T. Noon.

Sun's decl. 20° 14′ 04″ S. Diff. for 1 hour 32″.

Equation of time — 11m 1s.8. Diff. for 1 hour 0s .75 (increasing).

No. 14. Feb. 28, 1918, G. M. T. Noon.

Sun's decl. 8° 09′ 45″ S. Diff. for 1 hour 56″ .5.

Equation of time — 12m 47s.2. Diff. for 1 hour 0s .46 (decreasing).

No. 15. July 10, 1918.

Sun's decl. 22° 18′ 59″ N. Diff. for 1 hour 18″.4.

Equation of time — 5m 3s .1. Diff. for 1 hour 0s .37 (increasing).

No. 16. June 28, 1916, G. M. T. Noon.

Sun's decl. 23° 17′ 44″ N. Diff. for 1 hour 7″.3.

Equation of time — 2m 59s. Diff. for 1 hour 0s .51 (increasing).

No. 17. Aug. 2, 1918, G. M. T. Noon.

Sun's decl. 17° 55′ 05″ N. Diff. for 1 hour 38″.1.

Equation of time — 6m 8s .3. Diff. for 1 hour 0s .16 (decreasing).

No. 18. Oct. 23, 1918, G. M. T. Noon.

Sun's decl. 11° 13′ 11″ S. Diff. for 1 hour 52″.8.

Equation of time + 15m 31s. Diff. for 1 hour 0s .36 (increasing).

NOTE.—The signs + or — in regard to Equation of Time means; as applied to MEAN time in order to obtain apparent time.

NOTE.—All the problems in this work may be plotted on ordinary charts with large scale or on the U. S. Hydrographic Office plotting sheets, but the use of UTTMARK'S Plotting Chart is far more convenient.

Uttmark's Nautical Academy

Established 1882

8 State Street, New York City

Facing Battery Park

This academy is recognized as the oldest and best equipped Nautical school in the United States. It is up to date in every respect

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